YARMONENKO, S.P.; AVRUNINA, G.A.; SHASHKOV, V.S.; GOVORUN, R.D.

Action of radiation protectors in whole-body irradiation by high-energy protons. Probl.kosm.biol. 2:388-392 '62. (MIRA 16:4)

(RADIATION--SAFETY MEASURES)
(PROTONS--PHYSIOLOGICAL EFFECT)

ZHEREBCHENKO, P.G.; KRASNYKH, I.G.; KUZNETS, Ye.I.; SUVOROV, N.N.; SHASHKOV, V.S.; YARMOLENKO, S.P.

Radioprotective effect of the combined use of amines. Med.rad. no.3:67-72 '62. (MIRA 15:3)
(RADIATION PROTECTION) (AMINES)

40478

S/205/62/002/002/011/015
I020/I215

27.1220

AUTHORS: Lebkova, N. P. and Yarmonenko, S. P.

TITLE: The time factor in the radiation-protective effect of local asphyxia of bone marrow

PERIODICAL: Radiobiologiya, v. 2, no. 2, 1962, 304–307

TEXT: This is the continuation of a previous study. Adult mice weighing 18–22 g were irradiated in a special apparatus which allows automatic application of a tourniquet. A single dose of 700 r for 40 sec at a rate of 1050 r/min was applied with a PYM-3 (RUM-3) unit. The tourniquet was applied 2 and 1 min before irradiation and 10 sec after irradiation. The smallest injuries to bone marrow were observed when the tourniquet was applied 2 min before irradiation. In another experiment the mice were irradiated with a single dose of 700 r (35 r/min). The tourniquet was applied on two legs 5–10 min before irradiation. From one leg it was removed immediately after irradiation and from the second 20 in later. Some differences in the mitotic index, chromosomal aberrations and telephases with chromosomal bridges were observed in bone marrow following postradiation asphyxia, but these are not conclusive. A tourniquet applied for 2 hours caused degenerative changes in the bone marrow in both irradiated and non-irradiated animals. There is 1 figure 4 and tables.

SUBMITTED: July 28, 1961

Card 1/1

S/205/62/002/001/003/010
D268/D302

AUTHORS: Yarmonenko, S.P., Avrunina, G.A., Shashkov, V.S., and Govorun, R.D.

TITLE: The oxygen effect in whole-body irradiation with high energy protons

PERIODICAL: Radiobiologiya, v. 2, no. 1, 1962, 125 - 127

TEXT: Biological protection and its dependence on the oxygen effect were studied in male white mice (weight 21 - 23 g) chemically protected by peritoneal injection of the following 10 - 15 min. before irradiation: MEA (beta-mercaptoethylamine chlorohydrate), cystamine dichlorohydrate, and AET (S, beta-aminoethylisothiouronium bromide hydrobromide) at 3 mg/mouse, 5-methoxytryptamine chlorohydrate at 1.5 mg/mouse, and Serotonin (5-hydroxytryptamine creatinine sulfate) at 1 mg/mouse. Serotonin and 5-methoxytryptamine were synthesized by N.N. Suvorov, and the remainder by F.Yu. Rachinskiy. Irradiation was by proton impulse beam (660 Mev) at a dose rate of 300 - 400 rad/min. from the synchrocyclotron at the Ob'yedinennyy

Card 1/3

The oxygen effect in whole-body ...

institut yadernykh issledovaniy (Combined Institute for Nuclear Research). All compounds tested increased survival, the average duration of life in protected animals being 8.1 - 16 days with doses in the range 1,070 - 1,472 rad as against 5.9 - 8.7 days for unprotected with 1,070 - 1,360 rad. Reduction in the biological effect can be attributed to reduction in ionizing density in relation to the acceleration of high energy protons. There was an increase in H_2O_2 yield in water irradiated with accelerated protons particularly at 1.8 - 7 Mev, which can be interpreted as an indirect indication of the oxygen effect appearing in proportion to particle acceleration. Since the oxygen effect increases under the action of high energy protons, it was thought that radiation sickness could be alleviated by preparations in which the oxygen effect plays a major role in the mechanism of radioprotection, and this was confirmed experimentally by local bone marrow asphyxia in mice irradiated with protons (660 mev) at 1,300 rad. There are 2 figures and 10 references: 6 Soviet-bloc and 4 non-Soviet-bloc. The references to the English-language publications read as follows: H.M. Patt,

Card 2/3

The oxygen effect in whole-body ... S/205/62/002/001/003/010 D268/D302

J.W. Clarck, H.H. Vogel, Proc. Soc. Exptl. Biol. and Med., 84, 189, 1953; H.M. Patt, R.L. Straube, Radiation Res., 1, 226, 1954; A. Forsberg, Acta radiol., 41, 56, 1954; P. Bonet-Maury, Disc. Faraday Soc., 12, 71, 1952.

ASSOCIATION: Institut gigiyeny truda i profzabolevaniy AMN SSSR, Moscow (Institute for Work Hygiene and Occupational Diseases, AMS USSR, Moscow)

SUBMITTED: July 18, 1961

Card 3/3

YARMONENKO, S. P.

34758
S/020/62/142/003/026/027
B144/B101

27.1220

AUTHORS: Kurlyandskaya, E. B., Avrunina, G. A., Ponomareva, V. L., Fedorova, V. I., Yanovskaya, B. I., and Yarmonenko, S. P.

TITLE: Relative biological efficiency (RBE) of 660 Mev protons

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 142, no. 3, 1962, 702-705

TEXT: The biological efficiency of 660 Mev protons produced in the 6 m synchrocyclotron of the Ob"yedinennyy institut yadernykh issledovaniy (Joint Institute of Nuclear Research) in Dubna was investigated and compared with the effect of x-rays. White mice and rats were whole-body irradiated with doses of 260 - 44,800 rad and 300 - 1600 rad, respectively. The interdependence of perishing time and radiation dose and the influence on the hematopoietic system were similar to those of x-rays, but the relevant RBE was much lower. Irradiations with proton doses of 565 rad and x-ray doses of 400 rad which are about equal as to their lethal effect produced, however, significantly different aftereffects. The gonads proved to be the most sensitive organs (RBE~ 1). The cancerogenic effect of 660 Mev protons was equal or somewhat stronger than that of x-rays.

Card 1/3

S/020/62/142/003/026/027
B144/B101

Relative biological efficiency...

The possibility of increasing the radioresistance in animals by radiation blockers was studied. β-mercapto ethyl amine hydrochloride, hydrobromide of δ,β-amino ethyl isothiouronium bromide, and serotonin creatinine sulfate yielded positive results. This is probably due to the reduced ionization density of 660 Mev protons. Their low RBE may result from the pulse character of the proton beam, the high dose intensity, and perhaps also from the reduction of the linear-energy expenditure with increasing particle energy. This problem has still to be solved. The RBE of different radiations should be detailed as to individual body systems and different periods after irradiation. V. P. Dzhelepov and M. M. Komochkov are thanked for assistance and advice. There are 4 figures, 1 table, and 9 references: 5 Soviet and 4 non-Soviet. The four references to English-language publications read as follows: J. B. Storer, P. S. Harris et al., Radiation, Res., 6, No. 2, 188 (1957); R. Ghyn, Intern. J. Rad. Biol., 2, No. 4, 399 (1960); H. M. Patt, J. W. Clarck, M. H. Vogel, Proc. Soc. Exp. Biol. and Med., 84, 1, 189 (1953); H. M. Patt, R. L. Straube, Radiation Res., 1, 2, 226 (1954).

Card 2/3

Relative biological efficiency...

ASSOCIATION: Institut gigiyeny truda i profzabolevaniy Akademii meditsinskikh nauk SSSR (Institute of Industrial Hygiene and Occupational Diseases of the Academy of Medical Sciences USSR)

PRESENTED: July 24, 1961, by I. I. Shmal'gauzen, Academician

SUBMITTED: July 21, 1961

Card 3/3

ACCESSION NR: AT4042722 S/0000/63/000/000/0510/0514

AUTHOR: Yarmonenko, S. P.; Kurlyandskaya, E. B.; Avrunina, G. A.; Gaydova, Ye.S.; Govorun, R. D.; Orlyanskaya, R. L.; Paly*ga, G. F.; Ponomareva, V. L.; Fedorova, V. I.; Shmakova, N. L.

TITLE: Reactions to radiation an chemical protection of animals subjected to the effects of high-energy protons

SOURCE: Konferentsiya po aviatsionnoy i kosmicheskoy meditsine, 1963. Aviatsionnaya i kosmicheskaya meditsina (Aviation and space medicine); materialy* konferentsii. Moscow, 1963, 510-514

TOPIC TAGS: corpuscular radiation, high energy proton, synchrocyclotron, gamma ray, radiation effect, radioprotective agent, RBE

ABSTRACT: Experiments were performed to determine the immediate and the delayed effects of high-energy protons and their RBE on animal organisms. High-energy protons of 660 Mev were generated on a synerocyclotron. Comparative tests using gamma rays from a Co^{60} source were used in establishing the RBE. Nonpure strain mice and rats were used, in addition to mice of the BALB and C-57Bl strains.

Card 1/5

ACCESSION NR: AT4042722

All materials were subjected to statistical analysis. In comparative experiments performed on rats subjected to a dose of 500 rad, the degree of injury to hemopoietic organs by protons was considerably less than injury caused by gamma radiation. The depression of hemopoiesis in the bone marrow and the spleens of animals irradiated by protons was less profound and less prolonged, and regenerative processes began earlier than in injuries produced by produced by gamma rays. This difference of effect was particularly clear in the dynamics of the peripheral blood. After exposure to gamma irradiation, a profound and prolonged anemia developed, accompanied by a loss of 44% of the erythrocytes and 51% of the hemoglobin. An equivalent dose of protons caused only insignificant lowering of these indices. Similar effects were observed in the white blood corpuscles, particularly in respect to neutrophiles. The results obtained confirm that the condition of peripheral blood does not reflect the true depth of radiation damage to hemopoiesis. In experiments with white mice, a study was made of early destructive changes in the brain marrow, the dynamics of mitotic activity, and the kinetics of cells with chromosomal injuries. Exposure to protons induced typical radiation degeneration of cells of the bone marrow, a slowing down of mitotic activity, and injuries to the chromosomes. A strong linear relationship of injury-to-dose was

Card 2/5

ACCESSION NR: AT4042722

observed in all three indices within the 250--1000 rad range. Exposure to equivalent doses of gamma rays produced more pronounced changes, indicating that the RBE of protons is equivalent to 0.5--0.7. Preliminary administration of radioprotective agents -- AET (S,β-aminoethylisothioronium), MEA (mercaptoethylamine), and 5-MOT(5-methoxytryptamine) -- diminished the number of degenerating and aberrant cells in the bone marrow in proportion to the effect of the indicated drugs on survival. The most effective appeared to be a combination of MEA and 5-MOT, whose use assured the survival of 50% of the mice when irradiated by doses of 1900 rad. If irradiation is fractionated, the protective effect of the drugs is reduced sharply, or it disappears altogether. In experiments on male mice of the BALB strain subjected to doses of 500 and 700 rad, reversible changes were observed in the weight of testicles. The change of weight and its subsequent recovery was due to the death and the subsequent regeneration of germ cells. Protons have a typical sterilizing effect on the genitalia, but their RBE, in comparison with gamma rays, lies between 0.6 and 0.7. The use of antiradiation drugs did not prevent the sterilizing action of protons, but it caused a somewhat smaller loss of weight of the testicles and produced a shorter period of sterility. White male mice which had been protected by AET, MEA, 5-MOT, and cystamine from the effects of proton doses of 1300--1600 rad recovered their generative functions

Card 3/5

ACCESSION NR: AT4042722

almost completely four to seven months after irradiation. The development of the first generation of 290 mice obtained by crossing the protected and irradiated males with intact females took place without visible somatic injuries. The relative effectiveness of protons and gamma rays in causing somatic mutations was studied on livers of white rats who were subjected to doses of 150 rad. Regeneration of the liver was induced by removing the large left and the front right lobes of the liver. The operation was performed 24 hours after irradiation. The animals were killed 30 hours after the operation, i. e., during the first wave of the increase of mitotic activity. Control animals had 6.9% of aberrant cells, while after irradiation by protons and gamma rays, the number of aberrant cells was 20% and 29%, respectively. This indicates that the RBE of protons in respect to somatic mutations is around 0.7. New data were obtained on the blastomogenic effect of protons. Out of 85 irradiated rats, tumors were found in 39. Twenty-five of them had multiple tumors in various locations. In experiments on non-pure strain white mice, it was possible to show that antiradiation drugs, while increasing the ratio resistance of the animals, do not prevent subsequent development of new growth. Out of 65 irradiated mice who died at various periods after exposure to protons in doses from 1300 to 1500 rad (after having previously received antiradiation protection), fourteen had leucosis and four had sarcoma.

Card 4/5

L 17054-63 EWT(m)/BDS/ES(j) AFFTC/ASD/AFWL S/205/63/003/002/022/024
AR/K

AUTHORS: Shmakova, N. L., and Yarmonenko, S. P. 58 57

TITLE: Cytological analysis of the action of high energy protons. Report 1. Cell degeneration and mitotic activity of bone marrow cells of mice subjected to the total irradiation with 660 Mev protons 19

PERIODICAL: Radiobiologiya, v. 3, no. 2, 1963, 291-293

TEXT: This article gives data regarding the dynamics of early degenerative changes and subsequent regenerative processes in the bone marrow of mice, subjected to the total irradiation with 660 Mev protons in 800-1000 rad doses. The irradiation with protons caused in mice typical radiation induced degeneration of bone marrow cells and suppression of mitotic activity. The degree of these effects depended on the absorbed dose. The total biological effect of 660 Mev protons with respect to the action of γ-rays of Co^{60} in equal absorbed doses (800 rad), judging from the number of degenerative cells in the bone marrow in the period of the first 24 hours comprises on the average 0.3. The authors express their gratitude to I. M. Shapiro for consultation and aid in methods in the course of experimentation. There are 3 tables.

~~XXXXXXXXX~~ Institute of Labor Hygiene and Occupational Diseases, /Academy of Medical Sciences of USSR, Moscow.

Card 1/2

S/0205/63/003/003/0453/0455

ACCESSION NR: AP3001073

AUTHOR: Yarmonenko, S. P.; Shmakova, N. L.

TITLE: Cytological analysis of the effect of high-energy protons: Part 2. Effect of S,Beta-aminoethylisothiuronium (AET) on cell destruction, mitosis, and chromosome aberrations in the bone marrow of mice subjected to total-body irradiation by 660-Mev protons

SOURCE: Radiobiologiya, v. 3, no. 3, 1963, 453-455

TOPIC TAGS: high-energy protons, 660-Mev protons, radioprotective agents, S,Beta-aminoethylisothiuronium, AET, radiogenic cellular degeneration, radiogenic mitotic activity increase, radiogenic chromosome damage

ABSTRACT: Combined effects of 660-Mev protons and AET (S,Beta-aminoethyl-isothiuronium) on bone-marrow cells of white mice were investigated at the Ob"yedinennyy institut yadernykh issledovaniy (Joint Institute of Nuclear Research) by personnel of the Institut gigiyeny truda i profzabolevaniy (Institute of Industrial Hygiene and Occupational Diseases). Administration

Card 1/2

ACCESSION NR: AP3001073

to male mice weighing 20 to 23 g of 3 mg of AET bromide,hydrochloride 5 to 10 min before total-body irradiation with 1000 rad resulted in a significant decrease in the frequency of radiogenic cellular degeneration in bone-marrow cells, an increase in mitotic activity, and a decrease in the number of cells showing radiogenic chromosome damage as compared to irradiated controls which did not receive AET. The beneficial effect of AET on the processes of cell division in the bone marrow indicate that AET is an effective radioprotective agent capable of increasing survival rates following irradiation by high-energy protons. Orig. art. has: 3 tables.

ASSOCIATION: Institut gigiyeny truda i profzabolevaniy, Moscow (Institute of Industrial Hygiene and Occupational Diseases)

SUBMITTED: 06Jun62 DATE ACQ: 01Jul63 ENCL: 00

SUB CODE: 00 NO REF SOV: 006 OTHER: 001

Card 2/2

L 13812-63 EWT(1)/EWT(m)/EDS/FS(b) AFFTC/ASD AR/K

ACCESSION NR: AP3003935 S/0205/63/003/004/0576/0581

56
55

AUTHOR: Yarmonenko, S. P.; Ivanov, V. N.

TITLE: Reproductive ability of mice irradiated with high-energy protons and treated with chemical protectors 19

SOURCE: Radiobiologiya, v. 3, no. 4, 1963, 576-581

TOPIC TAGS: proton irradiation, cysteamine hydrochloride, cystamine hydrochloride, AET, 5-methoxytryptamine, hydroxylamine, radioprotector, reproductive ability

ABSTRACT: The reproductive ability of irradiated male mice was studied by subjecting them to total-body irradiation with a collimated proton beam of 660 Mev from a synchrocyclotron at the Ob"yedinennyy institut yadernykh issledovaniy (Joint Institute of Nuclear Research). The animals were given intraperitoneal injections of the following protectors: 150 mg/kg cysteamine hydrochloride 5 to 10 min before exposure, 150 mg/kg cystamine hydrochloride 20 min before exposure, 150 mg/kg AET 5 to 10 min before exposure, 75 mg/kg 5-methoxytryptamine hydrochloride 20 min before exposure, and 60 mg/kg hydroxylamine 5 to 10 min before exposure. After 6 months, 26 male mice were mated with 78 intact females 2 to 3 months old (three females for each male). The reproductive ability of

Card 1/2

the mice was determined by the number of pregnant females, and the number and development of the offspring. Of 78 females, 48 became pregnant (62%) and gave birth to 287 young. The reproductive ability of male mice treated with radioprotectors before exposure to protons of 660 Mev in doses of 1300 to 1900 rad was fully recovered in 4 to 7 months after irradiation. The most effective protector was 5-methoxytryptamine, alone or in combination with cysteamine; less effective were AET and hydroxylamine, or a combination of both compounds. However, it is possible that the apparent advantage of some preparations over others is due to natural variations. Since the regeneration of spermatogenesis occurred four months after irradiation with 1900 rad, the sterilizing effect of protons does not differ markedly from that of x-rays or γ-rays. It is quite significant that the development of the first-generation progeny from irradiated male mice protected against the action of protons was normal. Orig. art. has: 3 tables.

ASSOCIATION: Institut gigiyeny* truda i profzabolevaniy, AMN SSSR, Moscow (Institute of Industrial Hygiene and Occupational Diseases, AMN SSSR)

SUBMITTED: 31Jul63 DATE ACQ: 15Aug63 ENCL: 00

SUB CODE: AM NO REF SOV: 007 OTHER: 008

G 10275-63 BDS/EWT(1)/EWT(m)/ES(b)--AFFTC/ASD--K

ACCESSION NR: AP3002859 S/0241/63/008/006/0032/0042

AUTHOR: Yarmonenko, S. P.

TITLE: Analysis of the effect of radioprotective agents from the standpoint of their practical use

SOURCE: Meditsinskaya radiologiya, v. 8, no, 6, 1963, 32-42

TOPIC TAGS: radioprotective agents, cystamine dihydrochloride, AET bromide-hydrobromide, 5-methoxytryptamine hydrochloride, mercamine hydrochloride, radioprotector/radiation dose ratios, fractional irradiation

ABSTRACT: A study was made of the relation between the dose of antiradiation drugs (cystamine dihydrochloride, AET bromide-hydrobromide, 5-methoxytryptamine hydrochloride, and mercamine hydrochloride, the last two given both singly and together), radiation dosage, and protective effects. White mice were irradiated with Gamma rays from a Co sup 60 radiation source at a dose rate of 57 r/min. Since ionizing radiation effects are cumulative, the study was conducted with repeated sublethal doses until a cumulative lethal dose was reached. Survival

Card 1/3

L 10275-63
ACCESSION NR: AP3002859

rates of the animals receiving various amounts of radioprotective agents were then compared with survival rates of controls irradiated under the same conditions without having received radioprotectors. Three test series were made using various radioprotector/radiation dose ratios. In the first, the drugs were administered in full and half doses preceding eight irradiations totaling 1400 r. In the second series, the drugs were administered in half doses only and the number of irradiations and administrations of the drugs was cut from eight to two doses of 450 r each or one dose of 850 r. The third series consisted of four irradiations totaling 1100 r preceded by one-third strength drug doses. It was concluded from the three test series that protective drugs may be used against fractionated irradiation in half doses as well as full doses. No direct numerical correlations were found to exist between the drug dose, the radiation dose, and the effectiveness of the protective agent. It was found that fractionation of the total radiation dose, of itself, reduces the effectiveness of radioprotectors. Simultaneous reduction of radiation (to one-fourth lethal dose) and drug (to one-third optimal dose) dosage caused the protective effect to disappear. The author reviews Soviet and non-Soviet literature on chemical radioprotectors and their practical application. Orig. art. has: 3 tables.

Card 2/3

L 10275-63
ACCESSION NR: AP3002859

ASSOCIATION: Radiotoksikologicheskaya laboratoriya Instituta gigiyeny truda i prof. zabolevaniy AMN SSSR (Radiotoxicology Laboratory of the Institute of Industrial Hygiene and Occupational Diseases of the Academy of Medical Sciences USSR)

SUBMITTED: 27Sep62 DATE ACQ: 23Jul63 ENCL: 00

SUB CODE: 00 NO REF SOV: 025 OTHER: 038

Card 3/3

OVAKIMOV, V.G.; YARMONENKO, S.P.; IVANOV, V.N.

State of the central M-choline reactive systems in Co-60 irradiated mice. Radiobiologiia 4 no.3:414-418 '64.
(MIRA 17:11)

1. Institut gigiyeny truda i professional'nykh zabolevaniy AMN SSSR, Moskva.

ABSTRACT: The present [illegible] radioprotectors in [illegible] radiation [illegible] chemical [illegible] for fractional [illegible]

Cont 2/3

L 18319-65
ACCESSION NR: AP4043313

3/3

ACCESSION NR: AP4025123 S/0241/64/009/003/0066/0070

AUTHOR: Yarmonenko, S. P.; Paly*ga, G. F.

TITLE: Analysis of the action mechanism of antiradiation agents during their application (Protective action of rectally administered preparations)

SOURCE: Meditsinskaya radiologiya, v. 9, no. 3, 1964, 66-70

TOPIC TAGS: antiradiation agent, mercamine, 5-methoxytryptamine, AET

ABSTRACT: The toxicity and protective effect of mercamine, 5-methoxytryptamine, and AET were studied in experiments with white male mice exposed to total-body γ-irradiation from a GUBE-800 apparatus with 900 rad at 241 rad/min. The antiradiation agents were introduced intraperitoneally, orally, or rectally 30 min before irradiation. The toxic effect produced by rect... administration of all three preparations was lower than that of

Card 1/2

ACCESSION NR: AP4025123

the intraperitoneal administration. Mercamine (150 mg/kg) produced no radioprotective effect when introduced orally, intraperitoneal administration produced a marked protective effect, rectal administration produced a similar effect only when larger doses (450—600 mg/kg) were used. Rectal administration of 5-methoxytryptamine exerted a marked radioprotective effect on the test animals. A dose of 150 mg/kg resulted in 66.7% survival, a dose of 300 mg/kg, in 83.3%. Rectal administration of mercamine (150 mg/kg) produced 10% survival; with 300 mg/kg mercamine, all test mice died. AET had hardly any radioprotective effect when introduced rectally. The protective effect of combined intraperitoneal administration of mercamine and 5-methoxytryptamine (150 + 75 mg/kg) resulted in 95% survival. The same dose introduced rectally resulted in 50% survival. Orig. art. has: 3 tables.

ASSOCIATION: none

SUBMITTED: 18Mar63 DATE ACQ: 17Apr64 ENCL: 00

SUB CODE: LS NO REF SOV: 000 OTHER: 000

Card 2/2

S/0020/64/157/002/0460/0463

ACCESSION NR: AP4042216

AUTHOR: Paly*ga, G. F., Yarmonenko, S. P., Shapiro, I. M.

TITLE: The repair of chromosome injury in resting liver cells of rats upon chronic gamma irradiation

SOURCE: AN SSSR. Doklady*, v. 157, no. 2, 1964, 460-463

TOPIC TAGS: chromosome, chromosome injury, radiation injury, resting liver cell, chromosome injury repair, rat liver, single radiation exposure, prolonged radiation exposure, low dose radiation exposure, high dose radiation exposure, cumulative radiation effect, mitotic index

ABSTRACT: Earlier studies have shown that radiation injuries of chromosomes caused by a single exposure are retained in resting liver cells of adult rats and mice for many months. The present study attempted to determine the possible relation between the time during which a certain radiation dose is absorbed and the repair process of injured chromosomes. Tests were conducted in 2 lots of white rats; one group received a single 150 rad dose at 26 rad/min., the other the same dose at 7.10^{-3} to $5.8.10^{-4}$ rad/min. The latter were irradiated around the clock except

Card 1/3

ACCESSION NR: AP4042216

when cells were removed for examination. The mitotic index was determined in controls and the animals of the first lot. Following stimulation of liver cell division by removing part of the liver the animals were sacrificed. The mitotic index, number of damaged chromosomes and extent of damage were determined. Results are figured. The mitotic index of the second lot did not differ much from controls. The lower the dose, the lower was the percentage of cells with chromosome aberrations. This effect increased with time; after 6 months hardly any difference from controls was observed. This was apparently due to repair of chromosome injuries in the resting cells (60% with one injured chromosome, 40% with 2 or more). On the basis of observations it was calculated that with time the number of repaired cells tends to reach 100%. This finding is supported by the absence of cells with 2 or more acentric fragments and bridges upon longer exposure. The concepts on the cumulative effects of exposure may thus have to be re-examined. Such summary effects may weaken or fail to appear with very low doses. It appears that the determinant factor in these tests was the low dose rather than prolonged exposure. It may thus be possible to regulate chronoc irradiation without recourse to observations from a single irradiation. Orig. art. has: 2 tables and 2 figures.

ASSOCIATION: Institut gigieny* truda i profzabolevaniy Akademii meditsinskikh

Card 2/3

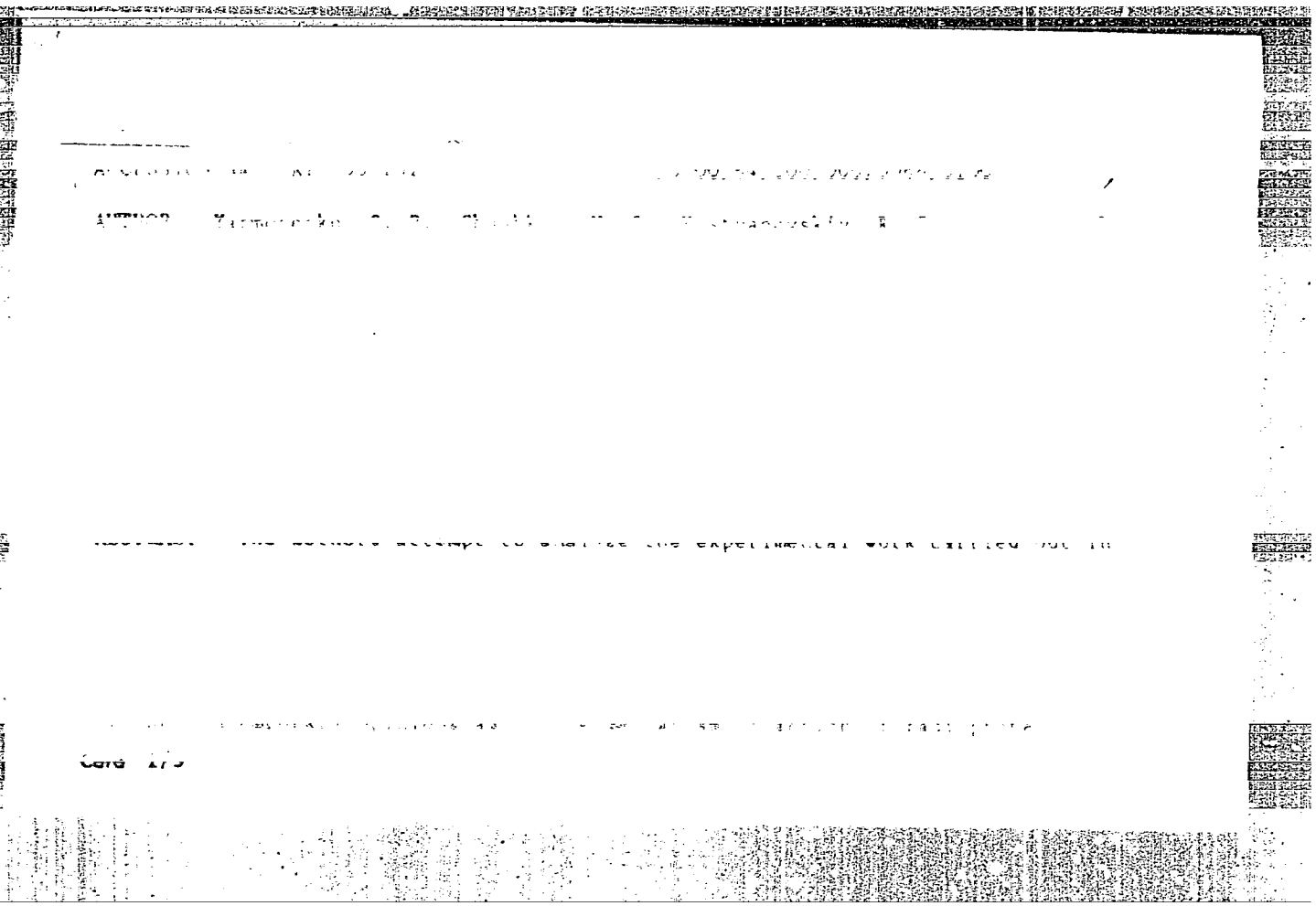
ACCESSION NR: AP4042216

nauk SSSR (Institute of Work and Professional Hygiene, Acad. of Medical Sciences SSSR); Institut morfologii zhivotnykh im. A. N. Severtsova Akademii nauk SSSR (Institute of Animal Morphology, Acad. Sciences SSSR)

SUBMITTED: 28Dec63 ENCL: 00

SUB CODE: LS NO REF SOV: 006 OTHER: 007

Card 3/3



L 41407-55

ACCESSION NR AT5003262

radiosensitivity due to chemical combination of target molecules with organic compounds, and the oxygen effect. The authors next review the world literature on investigations using model systems (physical, chemical, physicochemical and biochemical), using diverse vegetable, microbial, and animal objects. The main groups of radioprotective agents consist of the mercaptoalkylamines and indolyl-

[illegible] [illegible], sodium [illegible], calcium [illegible], [illegible] [illegible]

[illegible]

out three basic factors complicating the practical use of such protective agents: 1) During radiation therapy the protective agent must accumulate primarily in healthy tissues and secondarily in [illegible] tissues; 2) the narrow therapeutic range of the protective agents and their side effects; and 3) the ineffectiveness of the agents following fractional irradiation. To overcome the obstacles to the

Card 2/3

L 41407-65

ACCESSION NR: AT5003262

radioprotective agents with differentiation between the side effects and those determining their protective action; the combined use of various compounds both for [illegible] the protective action applicable to specific conditions of radiation

ASSOCIATION: None

SUBMITTED: [illegible] ENCL: 00 SUB CODE: LS

NO REF SOV: [illegible] OTHER: [illegible]

Card 3/3

L 59546-65 EWG(j)/EWT(m)
ACCESSION NR: AP5015733

UR/0205/65/005/003/0423/0427
628.58 : 577.391

AUTHOR: Yarmonenko, S. P.; Ovakimov, V. G.; Palyga, G. F.; Fedoseyev, V. [illegible]; Tarasenko, A. S.

TITLE: Fractional irradiation and the effect of chemical radioprotective agents. 1. Distribution of AET in animals associated with the quantity of agent administered, the route of administration, and irradiation conditions

SOURCE: Radiobiologiya, v. 5, no. 3, 1965, 423-427

TOPIC TAGS: radioprotective agent, AET, blood, liver, X irradiation, radiology

ABSTRACT: The relative distribution of AET-S^{35} in irradiated mice does not depend on the dose of the preparation used. Judging by the reduced effect observed after simultaneous decrease in the amount of the protective agent and the radiation dose applied fractionally, this finding tends to contradict the view that the mercaptoamines have an antiradical or disulfide mechanism of action. The AET content of mouse blood and liver reaches a maximum 2½ minutes after [illegible]

Card 1/2

L 59546-65

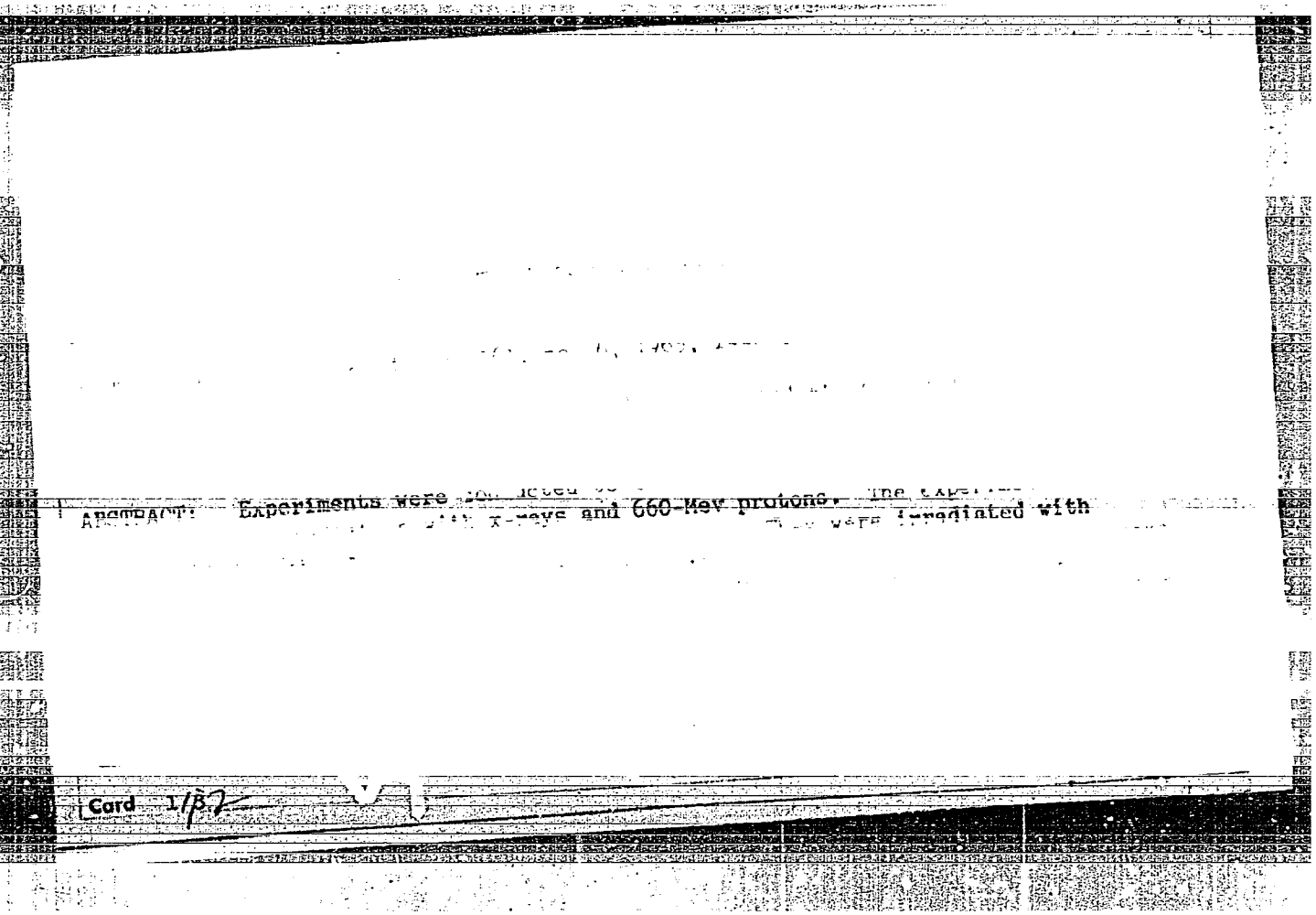
ACCESSION NR: AP5015733

2

brain, reaching a maximum 30 minutes after injection. When doses of AST known to be fatal are injected, the absolute amount of the compound in the brain when the animal died is one-half to one-fourth that when tolerable doses are used. Consequently, central action plays a secondary role in the mechanism of acute toxicity of AET. The authors [illegible] that the [illegible] effect of AET with [illegible]

toxicity. Orig. art. has: 7 tables.

ASSOCIATION [illegible]



ABSTRACT: Experiments were [illegible] with X-rays and 660-Kev protons. The [illegible] were irradiated with

Card 1/3

L 49782-65

ACCESSION NR: AP5012711

AUTHOR: Yarmonenko, S. P.; Konoplyannikov, A. G.; Suvorov, N. N.; Fedoseyev, V. M.

TITLE: The action of protective agents [illegible]

radioprotective agents, radiation [illegible]

ABSTRACT: The authors' experiments [illegible]

Card [illegible]

regardless of the irradiation

The resultant data also confirm the
in decreasing the dose and thus preserving a mass of hemopoietic cells
regeneration. This was also shown by experiments in which

YARMONENKO, S.P.; BERGEL'SON, V.M.; ABRAMOV, R.G.; KIL'DISHEVA, O.V.; LIN'KOVA, N.G.; KNUNYANTS, I.L., akademik

Cystaphos (monosodium salt of β-aminoethylthiophosphoric acid) as a means for increasing the effectiveness of the chemotherapy of tumors. Dokl. AN SSSR 162 no.2:476-479 My '65. (MIRA 18:5)

1. Institut gigiyeny truda i professional'nykh zabolevaniy AMN SSSR; Gosudarstvennyy [illegible] institut im. P.A.Gertsena i Institut elementoorganicheskikh soyedineniy AN SSSR.

L 11251-66 EWT(l)/EWT(m)/FS(v)-3 SCTB/DIAAP DD/RD

ACC NR: AT6003849 SOURCE CODE: UR/2865/65/004/000/0139/0164

65

AUTHOR: Yarmonenko, S. P.; Konoplyannikov, A. G.

ORG: none

2, 49,55 19

TITLE: Antiradiation protection in connection with the problem of the RBE of radiations with low specific ionizations

SOURCE: AN SSSR. Otdeleniye biologicheskikh nauk. Problemy kosmicheskoy biologii, v. 4, 1965, 139-164

TOPIC TAGS: ionizing radiation, RBE, linear energy transfer, radiation protection, x ray irradiation, gamma irradiation, experiment animal, rat, mouse, cell physiology, fungus, radiation dosimetry, antiradiation drug

ABSTRACT: In this review article, the authors present the results of 74 Soviet and 50 Western studies in tabular and graphic form. Some of the Soviet results are presented in the following figures and tables:

Card 1/15

2

L 14251-66

ACC NR: AT6003849

Table 1. The RBE of radiations of low specific ionization (linear energy transfer (LET) in kev per 1 micron of passage)

Recorded Effect	Standard Radiation		Compared Radiation		
	Type	LET	Type	LET	RBE
Death of yeast cells	x-rays 200 kv	2.9	x-rays particles 22 mev	0.2	0.85
Same as above, haploid strain	x-rays 180 kv	3.0	gamma rays Co-60	0.3	0.76
Same as above, diploid strain	x-rays 180 kv	3.0	gamma rays Co-60	0.3	0.84
Chromosomal aberrations in a human cell culture at various cellular phases	x-rays 180 kv	3.0	gamma rays Co-60	0.3	0.17-0.26
Rats, LD 50/30	x-rays 180 kv	3.0	gamma rays Co-60	0.3	1.0

Card 2/15

Table 1. The RBE of radiations of low specific ionization (linear energy transfer (LET) in kev per 1 micron of passage) (Cont.)

Rabbits, LD 100/30	x-rays 180 kv	3.0	gamma rays Co-60	0.3	1.5-1.7
Dogs, LD 100/30	x-rays 180 kv	3.0	gamma rays Co-60	0.3	1.3-1.6
Dogs, LD 50/30	x-rays 180 kv	3.0	gamma rays Co-60	0.3	1.5
Chromosomal aberrations in rat liver cells	x-rays 180 kv	3.0	gamma rays Co-60	0.3	0.7

Table 2. Dependence of RBE on the hardness of radiation and species of animal

Animal	MLD 100/30		RBE of Co-60 gamma rays
	x-rays, 180 kv	gamma rays, Co-60	
Mice	700	850	0.82
Rats	850	750	1.13

L 14251-66

ACC NR: AT6003849

Table 3. The RBE of high-energy particles (LET in Kev/micron)

Recorded Effect	Standard Radiation		Compared Radiation		
	Type	LET	Type	LET	RBE
Death of yeast cells	x-rays 200 kv	2.9	deutrons 190 Mev	0.9	1.0
Same as above, haploid strain	x-rays 180 kv	3.0	protons, 130-660 Mev	0.3-0.7	0.76
Same as above	gamma rays Co-69	0.3	protons 130-660 Mev	0.3-0.7	1.0
Same as above, diploid strain	gamma rays Co-69	0.3	protons 660 Mev	0.3	1.0
Sex determined recessive mutations in fruit flies	x-rays 180 kv	3.0	protons 660 Mev	0.3	1.0
Mice, LD 50/30	x-rays 180 kv	3.0	protons 660 Mev	0.3	0.7*
Same as above	x-rays 180 kv	3.0	protons 660 Mev	0.3	0.67

Card 4/15

L 14251-66
ACC NR: AT6003849

Table 3. The RBE of high-energy particles (cont.)

Same as above	gamma rays Co-60	0.3	protons 660 Mev	0.3	0.9
Same as above	gamma rays Co-60	0.3	protons 660 Mev	0.3	0.8*
Same as above	gamma rays Co-60	0.3	protons 130 Mev	0.7	0.8
Same as above	gamma rays Co-60	0.3	protons 126 Mev	0.7	0.7
Death of mice	x-rays 180 kv	3.0	protons 660 Mev	0.3	~1.0
Mice, LD 50/30	x-rays 180 kv	3.0	protons 660 Mev	0.3	0.7*
Same as above	gamma rays Co-60	0.3	protons 510 Mev	0.3	0.75
Same as above	gamma rays Co-60	0.3	protons 240 Mev	0.4	0.73
Same as above	gamma rays Co-60	0.3	protons 126 Mev	0.7	0.70
Death of rats due to fractionized radiation	x-rays 180 kv	3.0	protons 510 kv	0.3	0.8

Card 5/15

L 14251-66

ACC Nr: AT6003849

Table 3. The RBE of high-energy particles (cont.)

Death of dogs from a single irradiation	gamma rays Co-60	1.3	protons 510 and 240 Mev	0.3-0.4	1.14
Same as above	x-rays 180 kv	3.0	protons 126 Mev	0.7	1.0
Death of dogs due to fractionized irradiation	x-rays 180 kv	3.0	protons 510 Mev	0.3	1.0
Rats, state of marrow and blood	x-rays 180 kv	3.0	protons 660 Mev	0.5	<1.0
Rabbits, hematological shifts	x-rays 180 kv	3.0	protons 480 Mev	3.0	~1.0
mice, bone marrow cell degeneration	gamma rays Co-60	0.3	protons 660 Mev	0.3	0.9
mice, chromosomal aberrations in bone marrow cells	gamma rays Co-60	0.3	protons 660 Mev	0.3	0.9*

Card 6/15

L 14251-66
ACC NR: AT6003849

Table 3. The RBE of high-energy particles (cont.)

rats, chromosomal aberrations in liver cells	gamma rays Co-60	0.3	protons 660 Mev	0.3	~0.9*
mice, chromosomal aberrations in the corneal epithelium	x-rays 180 kv	3.0	protons 126 Mev	0.7	0.67
	gamma rays Co-60	0.3	protons 660 Mev	0.3	0.9*
mice, decreased weight of testes	gamma rays Co-60	0.3	protons 660 Mev	0.3	0.8
mice, decreased weight of testes and dominant lethality	x-rays 180 kv	3.0	protons 660 Mev	0.3	0.6*
	gamma rays Co-60	0.3	protons 660 Mev	0.3	0.85*
rats, decreased weight of testes	x-rays 180 kv	3.0	protons 660 Mev	0.3	1.0*
Same as above	gamma rays Co-60	0.3	protons 660 Mev	0.3	0.8
rats, male dominant lethality	x-rays 180 kv	3.0	protons 510 Mev	0.3	0.7

*RBE coefficient computed with correction for the purpose of making dosimetry more precise.

Card 7/15

Table 4. Viability of rats exposed to proton irradiation according to different Soviet researchers

Proton energy, Mev	Indices	Dose, rad
660	LD 50/30 LD 100/30	760 1050
510	LD 50/30 LD 100/30	580 830, 430-550

Table 5. Determination of the constant K for different radiations of low specific ionization

Ionizing Radiation	LD 100/30, rad	LD 100/4, rad	K = LD 100/4 / LD 100/30
660 Mev protons	950-1000	1350-1450	1.4
Co-60 gamma rays	850-900	1200-1300	1.4
x-rays	700-750	1100-1300	1.7

L 14251-66

ACC NR: AT6003849

Table 6. Comparative radioprotective effect of some agents during radiations of low specific ionization*

Protectors, how administered	x-rays, 180 kv 670-720 rad		gamma rays, Co-60 810-1100 rad		660 Mev protons, 950-1100 rad	
	no. mice	% viability	no. mice	% viability	no. mice	% viability
control	120	5	115	2	140	2
mercamine chlorhydrate, 150 mg/kg	40	60	50	70	70	60
cystamine dichlorhydrate, 150 mg/kg	30	46	30	30	46	95
AET dihydro-bromide, 150 mg/kg	89 -	62 -	30 40	40 75	68 60	85 81

Card 10/15

L 14251-66

ACC NR: AT6003849

Table 6. Comparative radioprotective effect of some agents during radiations of low specific ionization* (cont.)

Protectors, how administered	x-rays, 180 kv 670-720 rad		gamma rays, Co-60 810-1100 rad		660 Mev protons, 950-1100 rad	
	no. mice	% viability	no. mice	% viability	no. mice	% viability
l-cysteine chlorhydrate, 150 mg/kg	20	70	-	67	15	73
2-aminothiazoline bromhydrate, 150 mg/kg	-	35	-	-	15	60
3-aminothiosulphuric acid, 250 mg/kg	50	50	-	-	15	27
5-hydroxytryptamine creatinine sulphate, 75 mg/kg	80	50	40	60	54 30 30	43 43 50
5-methoxytryptamine chlorhydrate, 50 mg/kg	20 40 75	65 90 68	20 20 40	45 75 70	69 30 30	48 60 70

Card 11/15

L 14251-66

ACC NR: AT6003849 Table 6. Comparative radioprotective effect of some agents during radiations of low specific ionization* (cont.)

Protectors, how administered	x-rays, 180 kv 670-720 rad		gamma rays, Co-60 810-1100 rad		660 Mev protons, 950-1100 rad	
	no. mice	% viability	no. mice	% viability	no. mice	% viability
tryptamine chlorhydrate, 100 mg/kg	30 30	4 36	20 -	20 -	20 -	15 -
cystamine dichlorhydrate, 300 mg/kg	30	30	-	-	15	27
ATP, 250 mg/kg	-	-	-	-	15	40
testosterone propionate, 100 mg/kg (for 14 days)	-	-	-	17-29	20	35

*Injection of agents 5-20 min prior to irradiation (excluding testosterone propionate)

Card 12/15

L 14251-66

ACC NR: AT6003849

Table 7. Effectiveness of combined radioprotectors

Dose, rem	Preparations, dose	x-rays 180 kv		gamma rays Co-60		protons 660 Mev	
		no. mice	% viab.	no. mice	% viab.	no. mice	% viab.
700-750	mercamine, 150 mg/kg, and 5 methoxytrypta-mine, 75 mg/kg	50	92	18 19	95 95	33	67
1000	Same as above	40	27	-	-	40	50
950	mercamine, 150 mg/kg, and serotonine, 75 mg/kg	-	-	-	-	30	53
950	mercamine, 150 mg/kg	-	-	-	-	15	33
750	hydroxylamine, 60 mg/kg and AET, 150 mg/kg	20	90	27	81	31	87

Card 13/15

Table 7. Effectiveness of combined radioprotectors (cont.)

Dose, rem	Preparations, dose	x-rays 180 kv		gamma rays Co-60		protons 660 Mev	
		no. mice	% viab.	no. mice	% viab.	no. mice	% viab.
950	mercamine, 150 mg/kg and potassium cyanide, 2 mg/kg	-	-	-	-	15	40
950	mercamine, 150 mg/kg	-	-	-	-	15	33

L 14251-66

ACC NR: AT6003849

The following approaches are suggested for further sutdies of the problem of the connection between linear energy transfer and the biological effects of high-energy particles: 1) a quantitative evaluation of modifying factors; 2) elucidation of injury and preparation on the cellular level, including a detailed analysis of injury to genetic structures; 3) evaluation of the specific significance of secondary radiations which occur during the irradiation of large animals by protons; 4) elucidation of the long-range consequences of irradiation by high energy particles. Orig. art. has: 3 figures and 9 tables. [ATD PRESS: 4091-F]

SUB CODE: 06 / SUBM DATE: none / ORIG REF: 069 / OTH REF: 055

Card 15/15

L 20696-66 EWT(1)/EWT(m)/T JK
ACC NR: AP6007767 SOURCE CODE: UR/0205/66/006/001/0112/0114

35
33
15

AUTHOR: Alekseyeva, O. G.; Lavrenchik, Ye. I.; Yarmonenko, S. P.

ORG: Institute of Labor Hygiene and Occupational Diseases AMN SSSR, Moscow (Institut gigiyeny truda i profzabolevaniy AMN SSSR)

TITLE: The action of radiation protection agents during fractional irradiation. 3. Evaluation of the effectiveness of vaccine prophylaxis during prolonged irradiation

SOURCE: Radiobiologiya, v. 6, no. 1, 1966, 112-114

TOPIC TAGS: irradiation resistance, irradiation damage, radiation protection, x ray irradiation, gamma irradiation

ABSTRACT: Vaccines and chemical protectors were tested on white mice in order to determine their protective effect against x-ray and gamma irradiation. The experiments were performed on 1300 white male mice weighing 20—23 g. The RUM-11 machine was used for the x-ray irradiation. Its parameters are as follows: 180 kw, 15 ma, filters: 0.5-mm Cu and 1-mm Al, dosage 40 rad/min, distance from anticathode: 35 cm.

UDC: 628.58

Card 1/2

L 20696-66 2
ACC NR: AP6007767

The GUBE-800 machine was used for Co^{60} gamma irradiation. It was found that yeast lysates (prepared by the Institute of Microbiology AN SSSR) injected intraperitoneally in mice 2 weeks prior to exposure to an 800-rad dose of gamma irradiation had no protective effect and, when injected immediately after irradiation, even shortened the life of the mice. BTsZh vaccine (prepared by the IEM im. N. F. Gamalei) was injected intraperitoneally (1 mg per mouse) 2 weeks before exposure to irradiation; the vaccine was not found to change the degree of radiation sickness. Injections of the chemical protectors, sodium aminoethylthiophosphate and aminoethylisothiuronium, were found to be effective; the survival rate was 52% and 59% higher than in the control animals. Both preparations were injected intraperitoneally (7 mg per mouse) 10-15 minutes prior to irradiation. Tables showing survival rates for mice injected with the vaccines and chemical protectors (separately and in combination) and for one-time and repeated irradiation are given. Orig. art. has: 2 tables. [14]

SUB CODE: 06/ SUBM DATE: 14Dec64/ ORIG REF: 009/ OTH REF: 004
ATD PRESS: 4123

Card 2/2 BK

L 27529-66 EWT(m)

ACC NR: AP6012247 SOURCE CODE: UR/0205/65/005/006/0899/0906

21
B

AUTHOR: Yarmonenko, S. P.; Ovakimov, V. G.; Ol'shevskaya, O. P.; Lavrenchik, Ye. I.

ORG: Institute of Sanitary Works and Professional Diseases, AMN SSSR, Moscow (Institut gigiyeny truda i profzabolevaniy AMN SSSR)

TITLE: Effect of antiradiation agents[19] under fractioned irradiation conditions. 2. Protective effect with different dosages and time intervals between irradiations

SOURCE: Radiobiologiya, v. 5, no. 6, 1965, 899-906

TOPIC TAGS: bone marrow, radiation biologic effect, radiation sickness, antiradiation drug, mouse

ABSTRACT: This study was conducted to provide new data necessary for understanding the action of protectors in fractioned irradiation. The effects of intraperitoneal injections of AET (aminoethylisothiuronium dihydrobromide), cystaphos (sodium beta-aminoethylthiophosphate), and 5-MOT (5-methoxytryptamine hydrochloride) on the number of karyocytes, blood leukocytes and spleen weight were noted. In mice injected with AET, three days after single total irradiation or fractioned irradiation with dosages in the 270-700 r range, the number of bone marrow cells was

2

UDC: 628.58

Card 1/2

L 27529-66

ACC NR: AP6012247 O

higher by 2-3 million karyocytes per femur than in unprotected animals. The shielding effect of protectors in fractioned irradiation increases as the interval between individual irradiations increases. This is primarily connected with the degree of hemogenesis recovery. The result of the protective action of protectors in total and fractioned irradiation is a decrease of the effective radiation dose and acceleration of repairs due to the greater number of protected blood-forming cells in protected animals in comparison to the controls. Under fractioned irradiation conditions the use of a combination of cystaphos + 5-MOT significantly increased their protective effect, as compared to the protection effected by the component protectors, in both sub- and supralethal doses. Orig. art. has: 1 figure and 6 tables.

SUB CODE: 06/ SUBM DATE: 03Jun64/ ORIG REF: 006/ OTH REF: 005

Card 2/2 BLG

L 27570-66 EWT(m)

ACC NR: AP6018484 (A) SOURCE CODE: UR/0321/65/026/004/0501/0505

33
30
8

AUTHOR: Yarmonenko, S. P. (Moscow)

ORG: Institute of Labor Hygiene and Occupational Diseases, AMN SSSR, Moscow (Institut gigiyeny truda i profzabolevaniy AMN SSSR)

TITLE: Selective ability of antiradiation agents 19 to protect individual systems in animals

SOURCE: Zhurnal obshchey biologii, v. 26, no. 4, 1965, 501-505

TOPIC TAGS: bone marrow, mouse, digestive system, radiation biologic effect, radiation drug, drug effect, organic nitrogen compound

ABSTRACT: The purpose of the investigation was to compare the effects of certain radioprotective agents on the survival rate of mice irradiated in doses calculated to injure primarily bone marrow and the intestine and, if there were any indications of differentiated protection, to test a combination of the agents for potentiated effectiveness.

Aminoethylisothiuronium (AET), aminoethylthiophosphoric acid (AETP), and 5-methoxytryptamine (5-MOT) were injected intraperitoneally in doses of 1 and 1.5 mg/mouse 10 minutes before the animals were irradiated with 700, 800, 900, 1,000, 1,100, and 1,200 r. The $LD_{50/30}$ rose from 600 to 1,100 r, i.e., 1.83 times as compared with the control. However, the simultaneous administration of AET and 5-MOT increased the $LD_{50/30}$ to 1,100 r.

UDC: 539.104:001.5

Card 1/2

L 27566-66

ACC NR: AT6003024

strains of Staphylococcus aureus. Penicillin, streptomycin, chloromycetin and tetracyline were paired off in different combinations for the tests. Among results of 132 comparisons against 22 bacterial strains, coincidence of the paper strip method with Jawetz' test tube method was 95 times, with the paper disc method 89 times, and with the paper strip-slanted dish method 85 times. In results of 60 comparisons against 10 bacterial strains, the paper strip method showed coincidence with Stoke's test tube method 36 times, with the paper disc method 35 times, and with the paper strip-slanted dish method 33 times. Among 60 comparisons between the two test tube methods, identical results were noted only 44 times. The author concludes the paper strip method to be the simplest, results are easily observable, it saves on manpower and resources, and is suitable for large volume specimen testing. However, the author also feels its degree of coincidence with the test tube methods is not ideal enough. Orig. art. has: 3 tables and 4 figures.

SUB CODE: 06/ SUBM DATE: none/ ORIG REF: 001/ OTH REF: 005/

Card 2/2

L 08835-67 EWT(1) SCTB DD/GD

ACC NR: AT6033685 SOURCE CODE: UR/0000/66/000/000/0387/0388

AUTHOR: Shmakova, N. L.; Yarmonenko, S. P. 17

ORG: none

TITLE: Mechanism of injury and shielding of the bone marrow of animals against proton and x ray irradiation [Paper presented at the Conference on Problems of Space Medicine held in Moscow from 24-27 May 1966]

SOURCE: Konferentsiya po problemam kosmicheskoy meditsiny, 1966. Problemy kosmicheskoy meditsiny. (Problems of space medicine); materialy konferentsii, Moscow, 1966, 387-388

TOPIC TAGS: ionizing radiation biologic effect, proton radiation biologic effect, relative biologic efficiency, hematopoiesis, radiation tissue effect, bone marrow

ABSTRACT:

Experimental data were obtained on the kinetics of radiation injury to bone marrow in mice. Animals were irradiated with x-rays and high-energy protons in doses of 250—700 rem. Interstage death of cells, chromosome aberrations and delayed cell division were evaluated as factors contributing to radiation injury. Quantitative cytological analysis showed that bone marrow destruction in the first few days after irradiation was

Card 1/3

largely due to delayed cell division, combined with a normal rate of ejection of formed blood elements into the sanguiferous lumen. In the range of lethal and sublethal doses used, bone marrow destruction occurred exponentially, regardless of dependence on dose value of protective agents.

It was found that interstage death and chromosome injuries do not essentially alter the bone-marrow destruction rate, but they do determine the outcome of radiation injury, since they characterize the cellular balance of hemogenic organs and the degree of leukopenia in the period 3—4 days after irradiation. Neutrophil leukocytosis observed immediately after irradiation was caused by the necessity of removal of cellular detritus (formed in large amounts by the mass interstage death of cells).

Radioprotectors work by weakening all types of radiation injury to cells. They have a lesser or negligible effect on the kinetics of initial bone-marrow destruction. The protective effect is manifested by the beginning of regeneration, which is facilitated for protected animals because of the existence of a stock of undamaged hemogenic cells. The number of these undamaged cells with all radiation doses exceeds the number in unprotected control animals by 40%. This is caused by the difference in recovery rate.

L 08835-67

ACC NR: AT6036685

for mitotic activity and by the difference in quality of mitoses. On the basis of experimental data, methods of search for new radioprotectors and methods of early therapy for acute radiation sickness were discussed.
[W. A. No. 22; ATD Report 66-116]

SUB CODE: 06 / SUBM DATE: 00May66

Card 3/3

L 43947-66 EWT(m)

ACC NR: AP6023211 SOURCE CODE: UR/0020/66/168/006/1411/1414

33 31 B

AUTHOR: Yarmonenko, S. P.

ORG: Institute of Industrial Hygiene and Occupational Diseases, Academy of Medical Sciences SSSR (Institut gigiyeny truda i profzabolevaniy Akademii meditsinskikh nauk SSSR)

TITLE: Radioresistance of living organisms in the early postradiation period 19

SOURCE: AN SSSR. Doklady, v. 168, no. 6, 1966, 1411-1414

TOPIC TAGS: irradiation resistance, radioprotective agent, x ray radiation biologic effect, radiation damage, bone marrow, radiation tolerance, neutron radiation biologic effect

ABSTRACT: The author investigated M. M. Elkind's hypothesis that an initial increase in the radioresistance in animals is connected with the early elimination of sublethal injuries owing to the restoration and radiosensitive systems. The experiments were performed on 655 female white mice weighing 20-22 g and on 80 female white mice weighing 26-28 g. Whole-body x-irradiation was done in a uniform field at 15 ma, 180 kv, at a dose rate of 37 r/min with 0.5 mm CU + 1 mm Al filters. The criterion for determining the stage of radioresistance within the range of doses which cause "bone marrow death" was 30-day survival of the animals following two exposures to doses of 300 and 420 r at invervals of 1.5, 3, 6, 9, 12, 18, and 24 hrs as compared with sur-

UDC: 577.391:612.014.481

Card 1/2

L 43947-66

ACC NR: AP6023211

vival following a single irradiation by a 720 r dose. In the range of doses which cause the "enteric" form of death, the animals were subjected to two doses at 500 and 600 r at intervals of 1.5, 3, 6 and 24 hrs. Their survival rate was compared with that observed after single doses at 1100 r. Survival rates and results of bone marrow analyses under the various conditions of the experiments are graphed. The change in radioresistance of the organism, determined by sensitivity to repeated irradiation, was found to depend above all on the proliferative capacity of the bone marrow. Active restorative processes begin immediately after irradiation. They occur initially as a result of recovery of the vital capacity of the cell population in the bone marrow and intestines from sublethal doses, and later, as a result of regeneration. Changes in radioresistance following irradiation by large doses were of a similar nature. Comparison of the author's results with those obtained in experiments on neutron irradiation, in which no such changes in resistance were found, indicated a direct connection of the extent of cell damage with the magnitude of linear energy loss; at high values, cells are irreversibly damaged according to the "all-or-none" law. Special experiments have shown that the effectiveness of such radiation protection agents as cystaphos and mexamine is increased during the period of increased radioresistance. The author thanks I. F. Ivanova and Yu. D. Kuznetsov for technical assistance in carrying out the work. Presented by Academician I. L. Knunyants on 19 January 1966. Orig. art. has: 4 figures. [14]

SUB CODE: 06/ SUBM DATE: 12Jan66/ ORIG REF: 014/ OTH REF: 006/

ATD PRESS: 5060

Card 2/2 hs

L 3663-66 EWT(m) DIAAP

ACCESSION NR: AP5015731 UR/0205/65/005/003/0393/0401
539.125.4;577.391

AUTHOR: Gaydova, Ye. S.; Ivanov, V. N.; Yarmonenko, S. P.

TITLE: Cytological analysis of high-energy proton effects. 5. Comparative data on the effects of 660-Mev protons and cobalt-60 gamma rays on testes

SOURCE: Radiobiologiya, v. 5, no. 3, 1965, 393-401

TOPIC TAGS: high energy proton, biological effect, mouse, cytology, radiosensitivity, RBE, spermatogenesis

ABSTRACT: Experiments were conducted on half-grown male mice of the BALB line, whose radiosensitivity was high, and on normal white male rats. General and local irradiation of the testes of normal mice with a dose of 400 rad decreased the weight of the testes and severely inhibited spermatogenesis. The greatest effects were observed 28—30 days after irradiation. However, not all germ cells were destroyed, and recovery began after 40 days with nearly complete recovery by the 60th day. Animals were irradiated with 160-Mev protons in the OIYAI synchrocyclotron with a mean dose of 250—300 rad/min. Cobalt-60 gamma irradiation took place in a GUBE-800 apparatus at a mean dose of 300 rad/min. The animals were killed 10,

Card 1/3

L 3663-66

ACCESSION NR: AP5015731

20, 40, 60, and 90 days after irradiation, whereupon the testes were fixed for accurate cytological and statistical tests. As a control factor, the effects of protons and gamma rays on other radiosensitive organs were evaluated by measuring the change in weight of the spleens of mice. Of 70 mice irradiated with a proton dose of 500 rad, 7 died, while 25 of 90 died when irradiated with a 700-rad dose. Exposure to the same doses of gamma rays killed 40 of 110 and 170 of 210 animals, respectively. The control group was made up of 400 animals. In general, 660-Mev protons and gamma rays produced reversible changes in the weight of BALB mice testes at doses of 500—700 rad, and of normal rat testes at 250 rad. Radiation caused the destruction and subsequent regeneration of functional cellular elements. Protons in a dose of 685 rad or gamma rays in a dose of 430 rad produced about the same loss of reproductive ability in the majority of animals for 6 months after irradiation, followed by later recovery. The effect of 660-Mev protons in the testes of mice and rats was less than the effect of gamma rays. The RBE of protons calculated at the time of a 50-percent recovery in mouse testicular weight was 0.6—0.7. Orig. art. has: 3 tables and 6 figures. [CD]

ASSOCIATION: Institut gigiyeny truda i profzabolevaniy AMN SSSR, Moscow (Institute of Industrial Hygiene and Occupational Diseases, AMN SSSR)

Card 2/3

L 3663-66

ACCESSION NR: AP5015731

SUBMITTED: 04May63 ENCL: 00 SUB CODE: LS

NO REF SOV: 019 OTHER: 009 ATD PRESS: 4048

BVK

Card 3/3

YARMONENKO, S.P.; OVAKIMOV, V.G.; PALYGA, G.F.; FEDOSEYEV, V.M.; TARASENKO, A.G.

Action of chemical protectors in fractional irradiation. Report No.1: Distribution of AET in the animal organism as related to the protector dose, injection methods and irradiation conditions. Radiobiologiia 5 no.3:423-427 '65. (MIRA 18:7)

1. Institut gigiyeny truda i professional'nykh zabolevaniy AMN SSSR, Moskva i Moskovskiy gosudarstvennyy universitet imeni Lomonosova.

YARMONENKO, S.P.; KONOPLYANNIKOV, A.G.; SUVOROV, N.N.; FEDOSEYEV, V.M.

Effect of protectors in irradiation with sublethal doses. Dokl. AN SSSR 162 no.1:205-207 My '65. (MIRA 18:5)

1. Institut gigiyeny truda i professional'nykh zabolevaniy AMN SSSR; Moskovskiy gosudarstvennyy universitet i Vsesoyuznyy khimiko-farmatsevticheskiy institut im. S.Ordzhonikidze. Submitted January 21, 1965.

YARMONENKO, S.P.; KONOPLYANNIKOV, A.G.

Radiation protection as related to the problem of the relative biological effectiveness of rare ionizing radiations. Probl. kosm biol. 4:139-164 '65. (MIRA 18:9)